EXHIBIT D

UNITED STATES DISTRICT COURT
DISTRICT OF MINNESOTA

SM/lms

In re: Bair Hugger Forced Air Warming Products Liability Litigation

MDL No. 2666
(JNE/FLN)

- - - - - - - - - -

This is the Deposition of MICHAEL KEEN in the above-noted matter, taken at the offices of VICTORY VERBATIM REPORTING SERVICES, Suite 900, Ernst & Young Tower, 222 Bay Street, Toronto, Ontario, on the 14th day of July, 2017.

- - - - - - - - - - - - - - -

A P P E A R A N C E S:

GENEVIEVE M. ZIMMERMAN -- for the Plaintiffs
Meshbesher & Spence, Ltd.
1616 Park Avenue South
Minneapolis, MN 55404

PETER J. GOSS -- for 3M Company and
VINITA BANTHIA Arizant Inc.
Blackwell Burke P.A.
431 South Seventh Street
Suite 2500
Minneapolis, MN 55415

ALSO PRESENT:
Gabriel Assaad
Kate A. Crawford

--- upon convening at 10:00 a.m.

--- upon commencing at 10:01 a.m.

MICHAEL KEEN, sworn

EXAMINATION BY MS. ZIMMERMAN:

Q. Good morning, Mr. Keen. My name is Genevieve Zimmerman, and we just had an opportunity to meet a few minutes ago. I am one of the attorneys that represents a little over 2,600 people in the United States that have filed lawsuits against 3M and Arizant related to the Bair Hugger product, and I am here to ask you some questions about the expert report that you provided in this matter.

As we go forward today, I am going to be asking you some questions and the court reporter will be taking down some...taking down both my questions and your answers. So if we can do our best to make sure to let the other complete the question or complete the answer, that will make the court reporter's job easier. Is that fair?

A. Yes.

Q. All right. And you seem to be doing a good job to begin with, but one thing we do, just in normal speaking with one another, is do incomplete verbal answers like m'hmms and uh-huhs. That doesn't

rooms; is that right?

A. Yes, that is correct.

Q. All right. And, specifically, you wanted to know whether the hospital uses warming blankets or forced air heaters; is that right?

A. Yes.

Q. And Ms. Hogan responded to your initial e-mail on April 21st, and her response says:

"...In more than just ortho, we use both types, depending on the length of the expected surgery..."

Is that her response?

A. Yes.

Q. Okay. And then you then responded to her, it seems shortly thereafter also, on April 21st, and you say:

"...Okay. Thanks. I am doing a review of the forced air type in relation to infection control. Perhaps I could witness one in operation at some point?..."

Is it fair to say that you had not seen a forced air warming system during...in use in an operation prior to the time of this e-mail?

A. No. I had...I had been in...I had been in surgeries to witness before, but was not

give that testimony, as we sit here today?

A. I am prepared to give testimony on my report, yes.

Q. All right. And, really, I think what...from the plaintiffs' perspective, what we're getting at is whether or not the conclusions that you have reached or the opinions that you have offered in this matter are supportable, okay?

A. I understand.

Q. All right. And we are here to determine whether or not those opinions are reasonable as well, okay?

A. I understand.

MR. GOSS: Object to form.

BY MS. ZIMMERMAN:

Q. Now, as I understand it, you have not done any biological testing in connection with your work in this matter, have you?

A. I have not.

Q. Okay. And you have done no filtration testing in connection with your work on this matter, have you?

A. I have not.

Q. All right. You have conducted no

particle count testing on this case, have you?

A. I have conducted no particle count testing on this case.

Q. And, in fact, you haven't personally done any original testing in connection with your work on the Bair Hugger matter; is that fair?

A. That is correct.

Q. All right. And would you agree that you have done no...do you know what CFD is?

A. I know what CFD is.

Q. Computational fluid dynamics; is that right?

A. That is correct.

Q. You have done no computational fluid dynamics work or analysis in this matter; is that correct?

A. I have reviewed CFD papers, but I have done no original CFD analysis of my own in this case.

Q. Okay. You have done no calculations of your own in this case, correct?

A. I don't believe I have done any calculations related to this case, other than some conversions between units of measure.

Q. And would that be something like

A. I have had experience in design engineering work.

Q. All right. And you are a licensed engineer in Canada?

A. I am a licensed professional engineer in the province of Ontario within Canada.

Q. And you are a member of the professional engineering community in Canada; is that fair?

A. I am a member of the Professional Engineers of Ontario, as referenced on my resume.

Q. Okay. Have you had any experience ever in designing a medical device?

A. I have not had experience in designing a medical device.

Q. Did your education, in connection with your bachelor's degree, involve any courses on ethics?

A. Yes.

Q. What did you learn about ethics in your undergraduate degree?

A. Do you have a specific question? It was a big course.

Q. It was a large course? Was it a required course?

screen. So it may well be a window screen that is high efficiency for mosquitoes, but that doesn't mean it's impervious to other things. Do you understand that as well?

A. I understand that, and I am sorry for your mosquitoes.

Q. Yes. We're all sorry for mosquitoes. I suspect you have some of the problems that we have.

A. We also have mosquitoes.

Q. So the purpose of providing those perhaps cumbersome examples is to focus in on the words "high efficiency". Would you agree with me that saying "high efficiency" without additional qualifiers is not meaningful in discussing a filtration level?

A. Again, I would say that the term "high efficiency" I have seen commonly used as a generic layman's term for describing a filter, but it is not an official term that is used in the rating of filters.

Q. And someone that would be making decisions about whether to use a filter or which type of filter might...ought to be selected would need information probably beyond what a layman would need about the efficiency of a filter; does that seem

fair?

MR. GOSS: Objection, form, calls for speculation.

THE DEPONENT: The specification of a filter should rely on the official ratings.

BY MS. ZIMMERMAN:

Q. All right. And official ratings are determined...MERV puts out official ratings for filters; is that right?

A. MERV is a procedure for rating filters.

Q. Right. And what MERV does in rating filters is it talks both about the size of the particulate that will be filtered and the effectiveness of the filter at removing that size particle; is that right?

A. That is correct.

Q. Okay. And would you agree with me that, without either one of those modifiers, either the size of the particle or the effectiveness of the filter, the terms "high efficiency" on their own are not going to provide a professional with adequate information to make a decision pursuant to the MERV guidelines, for example?

A. I would agree that the term "high efficiency" does not provide adequate guidance as to the MERV rating of a filter.

Q. All right. And would you agree with me that "high efficiency" could tend to confuse a consumer who may not be as educated in the MERV ratings as someone such as yourself?

MR. GOSS: I am just going to object, we went from professional to consumer.

THE DEPONENT: I don't know if it would confuse a consumer.

BY MS. ZIMMERMAN:

Q. Are you familiar with the term "HEPA"?

A. I am familiar with the term "HEPA".

Q. And what does HEPA stand for?

A. You are going to test my memory. I am trying to remember the acronym. No, I don't want to hazard a guess right now. I have seen it many times, but I don't recall right now the acronym.

Q. But you would agree that HEPA is actually a term of art in filtration, correct?

A. HEPA is a term of a filter, yes.

Q. All right. And it describes a

opinions on filtration.

Q. Okay. Is there anything else that you can think of, as you are sitting here, that you did to independently research the issues presented?

A. The Price document listed in (k) is another one that I found through my research that found...that had some relevant information that I relied upon for my opinions.

Q. The Critical Environments Engineering Guide?

A. That is correct.

Q. Okay. Is that a peer-reviewed journal?

A. No, it is not.

Q. Did you ever Google Bair Hugger?

A. Yes, I did.

Q. And what did you learn from your Google search?

A. I can't recall all that I have learned from that. I looked at various websites on Bair Hugger, images of Bair Hugger. There were some YouTube videos on Bair Hugger that I looked at in that search.

Q. Can you recall who...were they videos that were put out by the Blackwell Burke law firm, or

do you know who produced the videos?

A. I don't recall who produced the videos that I looked at.

Q. Were they associated...you don't know if they were associated with Dr. Scott Augustine?

A. I do not recall.

Q. Okay. Have you spoken with any of the employees at 3M about the Bair Hugger product?

A. I have not.

Q. All right. Have you done any...I mean, we talked a little about PubMed. Have you done any other searches for peer-reviewed studies about the Bair Hugger?

A. In my search, I have looked at other studies. The studies that I found relevant have been included in my...that I have used to refer to my opinion have been included in my reference listing. I know that some of those blanks, and I can't remember which ones exactly, are ones that I have found as part of that search.

Q. All right. You would agree with me that operating room ventilation systems and designs for healthcare facilities are intended to provide a comfortable environment for patients, healthcare workers and visitors, while at the same time

system, to know?

A. Yes. The heat sources would be important to know.

Q. All right. And you agree with me that it would be important to know the heat sources specifically, and also how much heat is being produced by each of those sources, right?

A. I'm sorry, what is the context of your question?

Q. All right. So in designing an HVAC system...let's start just very basically. You have designed HVAC systems before for an operating room?

A. I have participated in design for HVAC system, yes.

Q. Have you ever done...been solely responsible for such a design?

A. No.

Q. All right. Do you rely on others to assist you in making determinations about the appropriate HVAC design in a hospital operating room?

A. I do.

Q. Who do you defer to?

A. I defer to our mechanical engineering design consultants.

Q. Okay. Do you know if, for example,

Dan Koenigshofer has designed HVAC systems in an operating room before?

A. Yes, I believe he has.

Q. All right. And would he be an appropriate person for you to collaborate with with respect to designing the HVAC system in an operating room?

A. Yes.

Q. He would. Would you feel comfortable designing an HVAC system for an operating room on your own?

A. No.

Q. And, as I understand it, ASHRAE contemplates that the HVAC system has two filters, correct, prior to having the air arrive in the operating room; is that right?

A. That is correct.

Q. All right. And what are those filters; do you know?

A. Yes. There is a pre-filter and a secondary filter.

Q. Do you know what MERV rating the pre-filter has?

A. Yes. The table requires a MERV 7 for the pre-filter for an operating room.

There is no one standard for what the diffuser arrangement must be; is that right?

A. No. There is standard minimum requirement for the design of the diffuser arrangement, which allows further flexibility beyond that standard.

Q. All right. And have you been involved with designing an HVAC system and these diffusers in operating rooms in the United States?

A. Yes, I have.

Q. Which ones?

A. I believe there was a facility in Georgia that I assisted the design on.

Q. Any others?

A. I don't believe there are any other U.S. ones, to my recollection.

Q. And who did you work with on the Georgia project?

A. There was an engineer from H.H. Angus & Associates.

Q. Do you happen to remember who the engineer was?

A. I don't remember the name, sorry.

Q. About how long ago was that?

A. That was approximately 22 years ago.

Celsius and 20 to 24 Celsius. The discussion of those ranges, that discussion takes into consideration the ability for bacterial growth to happen in those environments.

Q. And, at any rate, you are not a microbiologist, correct?

A. I am not a microbiologist.

Q. All right. And you don't have any training in aerobiology either, do you ?

A. I don't have training in aerobiology.

Q. And you're not going to be offering any opinions to the court in the Bair Hugger MDL case about issues touching on microbiology or aerobiology, are you?

A. I am not understanding the limitations to that question, so...I certainly speak about...in my report about different types of bacteria and microbiological particles as part of my report.

Q. Okay. And part of the purpose of both the deposition today and motion practice that will almost certainly follow as we approach trial next year, is a determination by the court about what the scope of your testimony properly may be. And, to that extent, that includes discussion and argument

based in fact or in reasonable science or in good engineering practice, so that we can determine whether they are reliable, okay?

A. Okay.

Q. All right. And that is the purpose for preparing a report and that is the purpose for the deposition today, to understand what it is that is the underlying support for the opinions you intend to offer in this case, all right?

A. Okay.

Q. And so what we are entitled to do today is to examine the full scope of what it is you intend to testify to, which means you don't get to come back next week or next month or on February 26th and change the numbers that you have offered in your expert report. You understand that?

A. I understand it, as you have just told me.

Q. Okay. And, at any rate, with respect to the transmission of pathogens and particularly with respect to bacteria, you would rely on a microbiologist to quantify the risk to patients, correct?

A. I would, yes.

Q. All right. Your report goes on to

sure.

Q. Okay. And do you have any idea, as you're sitting here, why that test was done several months after the tests in April of 2016?

A. I do not know why the time difference in that one.

Q. Have you been produced or provided with any copies of any tests on filtration done prior to 2016?

A. So the fourth test that I mentioned to you that was inconclusive, I don't know what the date of that test was.

Q. Okay. Would you expect that there would be tests on filters done throughout the course of the life cycle of the Bair Hugger products?

A. I would only be guessing, so, no, I wouldn't presume that.

Q. Okay. As an engineer, were you taught that it was important to test the products that you would develop or market or use?

MR. GOSS: Objection, vague.

THE DEPONENT: Yes. I didn't develop products.

BY MS. ZIMMERMAN:

months.

Q. Okay. Are any of them...were you... were any of them provided to you very recently?

A. No. This would be prior to the completion of my report.

Q. Okay. And did you rely upon those animations in reaching your opinions?

A. I would say that those videos were a component of what led to my final opinions.

Q. And are they reflected in the list of references in your report?

A. No, they are not.

Q. Why not?

A. Again, I don't...some of these videos I have seen but do not have official copies to be able to provide a reference to.

Q. All right. And where have you seen the videos, online?

A. Some of them have been online, yes.

Q. Were they provided to you by Dropbox or an FTP site or...where did you find them?

A. I think...I can't recall, to be honest.

Q. Okay. But you viewed these videos at some point as you were drafting your report and

relied on them in some way in reaching your ultimate opinions?

A. That is correct.

Q. All right. But they are not listed in the reference materials?

A. That is correct.

Q. Okay. And do you know, as you sit here right now, whether they were online publicly available or...

A. I know that for sure some of them were on YouTube and publicly available.

Q. Okay. There is a lot of stuff on YouTube, and I suspect that none of us rely on everything we see on YouTube. But the purpose of this deposition is to figure out what you have relied upon in reaching the opinions that you are prepared to offer in this case, and I am struggling because I don't...you know, I see a reference to Settles' report. But, to the extent that you are directed to or discovering videos on YouTube and relying on those in reaching your opinions, they are not disclosed here, and that makes the opportunity to investigate your reliance on those very difficult. What was it about the videos that you relied on?

A. I think, in general, the videos were

an animated depiction of what were described in some of the reports that I referenced. And so, again, they provided just additional dynamic visual context to support my research in coming up with opinions.

Q. So the videos supported your research. So, looking again at the references that you have listed...it is not an ASHRAE video, I trust; is that correct?

A. I do not believe there are any ASHRAE videos in what I saw.

Q. And there is no CSA standard video that you are relying upon, I assume?

A. No.

Q. Okay. Did you see any video put forth by the authors of this article number (c) and published in the Journal of Bone and Joint Surgery on "Intraoperative bacterial contamination in operations for joint replacement"?

A. Again, I will say right now that I do not recall exactly which reference documents the videos related to.

Q. So we could go through this entire list and, as you sit here today, you are not going to be able to tell me which one of these studies and/or articles and/or reports had a video that you relied

upon in forming your opinions but did not cite to?

A. Yes, I do not have the recollection at this time.

Q. Okay. What would refresh your recollection?

A. I imagine watching the video and understanding what study that it related to would refresh my memory.

Q. All right. Have you been provided the depositions of the study authors in these cases? I see, for example, that you have been provided a copy of an article written by Belani, Albrecht, McGovern, Mike Reed and Christopher Nachtsheim. It is listed as Exhibit number...pardon me, reference number (n), provided to you by counsel. Do you see that one?

A. Yes.

Q. Do you know that every one of those authors has been deposed in connection with this litigation?

A. No, I am not aware of that.

Q. And they have not produced any of these depositions to you for your review in this matter, have they?

A. The depositions that have been

BY MS. ZIMMERMAN:

Q. All right. Are you aware of whether or not there were videos made in connection with any of the published peer-reviewed studies?

A. Sorry, could you restate the question? I didn't get the first few words.

Q. Sure. Are you aware whether or not videos have been made in connection with any of these published peer-reviewed studies?

A. So, yes, as I answered earlier, I am aware that there are some videos related to some of the referenced documents that are shown here. I don't recall which ones they were.

Q. Okay. And I think...and, again, I am trying to get at which videos might they be. If they are on YouTube, I don't think that they are connected to any of the peer-reviewed journals that you have cited to.

A. I am sorry, on current reflection...

MR. GOSS: Wait for her to ask a question.

BY MS. ZIMMERMAN:

Q. Do you have any knowledge, as you sit here, about whether or not videos that you have been

provided access to or directed to may have been videos of experiments performed by Mr. Albrecht?

A. It is possible. I can't recall.

Q. And, as you sit here right now, do you have any sense or knowledge about whether they might be videos of experiments conducted by Mr. McGovern?

A. I can't recall.

Q. Do you know if you have been provided any of the videos prepared in connection with Dr. Sessler and Dr. Olmsted's publication?

A. I do not recall.

Q. And you don't recall, as you sit here, whether it may have been videos connected to this Belani, Albrecht, McGovern, Reed, Nachtsheim paper either, correct?

A. I do not recall.

Q. In fact, as you sit here, you have no idea what the videos are; is that right?

A. I do not recall the authors connected with the videos.

Q. All right. Can you describe the videos in detail?

A. I cannot describe the videos in detail.

Q. But you rely upon them in reaching and rendering the conclusions you have outlined in your report?

A. In watching the videos, they did provide a visual aid that helped me in forming my opinions.

MR. GOSS: I could use a bathroom break whenever you're ready.

MS. ZIMMERMAN: You can take a bathroom break.

MR. GOSS: Okay.

--- upon recessing at 3:56 p.m.

--- A BRIEF RECESS

--- upon resuming at 4:03 p.m.

MICHAEL KEEN, resumed

CONTINUED EXAMINATION BY MS. ZIMMERMAN:

Q. All right. Turning back to both Figure...the kind of hypothetical Figure 6 and Figure 7 in your report, Mr. Keen, it talks about...it attempts to depict the laminar airflow in the operating room, right?

A. Yes.

Q. Okay. And that laminar airflow,

Q. Are you on that page? Okay. You say here the air...the second sentence says:

"...[The] Air eventually escapes primarily through the head and neck area of the patient..."

What is your basis for that statement?

A. The basis for that statement has to do with descriptive images and video that I have seen on the draping of the Bair Hugger blanket.

Q. So you are able to tell where the air is escaping based on photographs?

A. Photographs, description and video, yes.

Q. Do you recall...you weren't provided a copy of Michael Stonnington's report?

A. That name is not familiar to me.

Q. Okay. Are you aware of reports from surgeons and orthopaedics that airflow may be escaping not just from the head and neck?

A. I am not aware of that.

Q. Okay. Were you told that you should assume that the air eventually escapes primarily through the head and neck area of the patient? Were you told to assume that by counsel?

A. That was information that was from

the documentation and video that I reviewed.

Q. Okay. So this also comes from the video that we don't know whose video it is?

A. No, sorry, in this case, I have seen...and this refers to a 3M video that...is it a 3M video...a video on YouTube that describes the application of the blanket and the ceiling and the draping. And that is different from the videos I was talking about before the break.

Q. All right. So that is another separate video that is not identified on your list of references; is that right?

A. Correct. That was one that I saw from YouTube.

Q. So, just so I understand, are there multiple videos on YouTube that you're relying on that aren't listed on the references?

MR. GOSS: Object to form.

THE DEPONENT: Some...

MS. ZIMMERMAN: I don't know how to fix that.

MR. GOSS: Well, I think what I am struggling with is, what "relying on" means may be different from his Canadian understanding than what we use in American

videos that certainly I saw. But, again, they did not provide any new independent information that I wasn't...that I had to rely upon to provide the opinions in my report, but were more visualizations of information I had already read.

Q. So the question or the statement that I was asking you about is:

"...Air eventually escapes primarily through the head and neck area of the patient..."

And I have asked you what the basis is for that statement, and you have directed me to a 3M video on YouTube about draping. How do you know from that video that the air eventually escapes primarily through the head and neck area of the patient?

A. Based on how the description of how the adhesives are applied, how different ports are closed off, and how...where it is left open, that shows where the air would primarily escape from.

Q. All right. How long is the video?

A. If I had...approximately four minutes.

Q. Have you seen or touched a Bair Hugger blanket itself?

A. I have not.

Q. All right. Can you describe a Bair

Q. Memarzadeh. Okay. You know him in some regard?

A. Yes, I do.

Q. And how do you know him?

A. I know him from my ASHRAE committee work.

Q. All right. And would you agree that he holds himself out as an expert in airflow?

A. Yes.

Q. And you would, I assume, defer to him on matters regarding airflow in an operating room?

A. Yes.

Q. And you understand from some of the materials that you have been provided in this case that Dr. Memarzadeh, that his work...that he agrees that the Bair Hugger disrupts laminar airflow, correct?

MR. GOSS: Object to form, foundation.

THE DEPONENT: I don't recall it saying the exact wording like that, but there is some wording in the...in Memarzadeh's paper that talks about the buoyant force that affects the airflow.

BY MS. ZIMMERMAN:

Kerho's experiments talking about the natural...the different buoyancy of the bubbles, to me, did not, in my opinion, form a representation that was accurate of the particles.

Q. Is it your testimony that bubbles are more or less than dense than particles in the air?

A. Of different density.

Q. Of different density?

A. Yes.

Q. But greater density or less density?

A. It depends on the particle or the groupings of particles or what the particles are attached to.

Q. All right. Are there any bubbles that you think could be appropriate proxies for particles in the air?

A. Not in my opinion.

Q. All right. Have you ever done any particle measurement?

A. I have not personally done particle measurement, but I have contracted for particle measurement to be conducted.

Q. So you have hired other people to do particle sampling and...

A. Yes, I have.

Q. All right. But you have never personally done particle sampling?

A. No, I have not.

Q. You are not familiar with any of the tools that are used to measure particles in the air?

A. I am familiar and seen some of the tools that were used by some of these contracted individuals, but I have not used them myself.

Q. All right. And it is not something that you are personally trained to use?

A. It is not something I am personally trained to use.

Q. All right. And it is not something that you would be in a position to offer any testimony about calibration or accuracy of measurements, or anything like that, because you don't have training in that field, correct?

A. I would not offer any testimony on the calibration of such equipment.

Q. All right. And harkening back then, I think that you were provided the deposition of Michael Buck in this matter; is that right?

A. Yes.

Q. I know the names all probably start to run together for all of us, especially at this

time. He is a plaintiffs' expert who conducted an experiment with respect to particles coming out of the Bair Hugger. Does that ring a bell?

A. I did not get the opportunity to read Buck's deposition.

Q. Okay. Were you ever provided a copy of his report?

A. No.

Q. So you're not going to be offering any opinions with respect to the particle measurements that Mr. Buck did in his experiment?

A. I am not offering any opinions about Buck's experiments.

Q. Okay. And with respect to the criticisms that you offer about the use of bubbles in studying particles in airflow, you refer heavily to this Kerho article at letter (q), the "Neutrally buoyant bubbles used as flow tracers in air"; is that right?

A. Yes. Kerho, I rely on, yes.

Q. Okay. And that was one of those articles where you weren't sure if you had it...if it was produced to you by counsel, or if you happened to come across that in your own research; is that right?

A. That is correct.

carry another contaminant in combination with it.

Q. And did you have any experience with characterizing particles prior to involvement in this case?

A. Yes.

Q. When?

A. I have been involved with...in the...in the design and application of isolation rooms, we have worked on understanding the characteristics of airborne versus droplet versus contact infection transmission toward the determination of what should be in the standards for design of these isolation rooms, and which application applies to which.

Q. And when you have been a part of those conversations, it has been a group conversation, I gather?

A. Yes.

Q. All right. And who else has participated in those conversations with you?

A. Members of the two committees... multiple committees between CSA and ASHRAE, actually, as well as in infection control practitioners, epidemiologists, directors of infection control.

Q. And with respect to particles

particle's ability to remain airborne and potentially carry microorganisms that could cause an infection, what is that based on; your experience?

A. Just these two sentences?

Q. Well, I mean, that is what you have identified in your report about what you are, I gather, about what you are prepared to say to a court or a jury in this case, correct?

A. Sorry, I'm confused. There is more than two sentences I talk about particles in the report. So I am not sure if you're referring to just the two sentences or the entirety of the report or...

Q. Well, this, we're talking about particle characteristics. And I have asked you about these two particular sentences. I mean, unfortunately, we are slogging through this whole thing, as you can see. But, to the extent that you are offering testimony or attempting to offer testimony in this matter...

A. Yes.

Q. ...about a particle's ability to remain airborne and whether or not a particle has the capacity to carry microorganisms, which potentially cause infections...

A. Right.

Q. ...I want to know what that is based on.

A. So that is based on, again, my review of relevant documentation and my experience to do with, as I mentioned, the characteristics of different infections and transmission of infections by either droplet, contact or airborne.

Q. Okay. And so, I asked about citations, at least, and that is the Noble piece that you have here?

A. Right.

Q. And then I asked you about experience, and you said, I think, that you sit on some committees that have addressed these issues. Is that fair so far?

A. Yes.

Q. We are on the same page. Okay. So, I said, "Who else is involved in those committees?" And I assumed that you would defer to a microbiologist or an infectious disease specialist with respect to...

A. And a number of them are on the committee, yes, as I mentioned.

Q. All right. And, in any event, if microbiologists and/or infectious disease physicians

come to trial in this case and offer testimony about particulates and their propensity to carry microorganisms, you're going to defer to their testimony in that regard?

A. Yes.

Q. Okay. Now, you list in Figure 11...it's a list of a number of different nosocomial pathogens that can become aerosolized; is that right?

A. Yes.

Q. And that comes from Kowalski, right, in 2012?

A. That is correct.

Q. All right. And what was the purpose, in your mind, of including this particular table?

A. It represents the various relative sizes of a number of different viruses, bacteria and fungi, and other pathogens to have an understanding of what the size of concern that we are dealing with in this matter here.

Q. Okay. And you understand that Kowalski's publication here has been cited by Dan Koenigshofer and I believe also Michael Buck as well, although you wouldn't know that because you didn't have his report. But you did see it, however, in Dan Koenigshofer's report, correct?

Q. Okay. And, similarly, you are not a physician, correct?

A. That is correct.

Q. So you are not going to be offering any testimony in this case with respect to issues regarding medicine, correct?

A. That is correct.

Q. All right. Similarly, with respect to particle physics, I think that you've said that you're going to defer to the particle physics experts in computational fluid dynamics; is that right?

A. That is correct.

Q. Okay. And with respect to engineering, you would defer to, I assume, folks that have gone about in designing an HVAC system for a hospital, correct?

MR. GOSS: Object to form.

THE DEPONENT: I would also rely upon my own opinions when it comes to engineering of hospital design.

BY MS. ZIMMERMAN:

Q. Okay. But you have testified already this afternoon that you would not feel comfortable designing an HVAC system for an operating room alone,

correct?

A. I don't recall the earlier testimony, but I am not...my current profession is not one of design. I certainly lead design activities for the hospital, and I am involved in design...making decisions as part of the standard activities I am involved with. But I am not employed today, in my role, as a design engineer. Despite my training as a mechanical engineer, that is not my current role.

Q. Okay. And you have not personally designed an HVAC system for an operating room by yourself before, correct?

A. Correct.

Q. All right. And you only, to this point, assisted in the design of one HVAC system that was used in a hospital in the United States at this point, correct?

A. No. That is one that I assisted in the design in the United States when you asked about facilities in the United States. I certainly have been involved in assisting with the design of systems at my own hospital.

Q. Okay. And let's break that into two pieces. With respect to designing HVAC systems for use in ORs in the United States, you have done that

once before, correct?

A. That is correct.

Q. All right. But you have done some other HVAC design work in teams in Canada, right?

A. Yes.

Q. Okay. And so, with respect to the next kind of paragraph that talks about what I would characterize as particle physics, talking about how particles settle over time, is it fair to say that you would defer to a particle physics specialist in matters of this regard?

MR. GOSS: Object to form.

THE DEPONENT: Yes, I would.

BY MS. ZIMMERMAN:

Q. And so, while you offered criticisms of what conclusions and methods Albrecht and Legg may have conducted and ultimately reached, you would defer to other folks on whether or not those were appropriate methods and conclusions, correct?

MR. GOSS: Object to form.

THE DEPONENT: I offered opinions related to those articles, and I felt qualified to offer those opinions. Where it related to particle physics, as you ask, then I would

A. That is correct.

Q. And that lists out the size in micrometres of various viruses and bacteria; is that right?

A. That is correct.

Q. And you would agree that, at least the staphylococcus aureus...are you aware that that is a bacteria?

A. Yes.

Q. All right. And the Kowalski chart that you cited in your report lists that as a .866 micrometre size, correct?

A. Yes.

Q. All right. And there are some additional bacteria that are listed in this Kowalski chart, but just, as it is getting to be a long day, we won't go through every one of the bacteria; is that fair? What is your basis for saying that the bacteria travel in clumps?

A. That is through my experience in understanding how the bacteria travels, and in also my review of the documentation that I reviewed as part of this case.

Q. All right. Do you know how many bacteria or pathogens it takes to cause a surgical

site infection?

A. No.

Q. Could it be as low as one colony-forming unit?

MR. GOSS: Objection, lack of foundation.

THE DEPONENT: I would defer to a...I would defer to an epidemiologist, microbiologist on the number of particles.

BY MS. ZIMMERMAN:

Q. Okay. At any rate, you are not going to be offering any testimony at trial in this matter about how many particles is required?

A. That is correct.

Q. All right. Or how many pathogens, I should say.

MR. GOSS: You can answer that one.

THE DEPONENT: Sorry, no, I won't be.

BY MS. ZIMMERMAN:

Q. All right. So you characterize the change in particle counts of 5.0 micrometre size as negligible in the Legg 2012 report; is that right?

A. I actually just, I believe, reported what Legg reported as a negligible change in particle

Q. And creating a cocoon. Okay. In any event, you would not think it is prudent to have a laminar flow system that was sufficiently powerful to overcome that protective cocoon, correct?

A. Correct.

Q. As you sit here today, besides Memarzadeh...and by the way, with the thermal plume section that is listed as subsection d), there's no citations to this. I see that this Figure 12 and 13, as I understand it, are your drawings to visualize the effect of this thermal plume, or the protective cocoon, as you call it. Are you aware of any scientific peer-reviewed evidence to support this thermal plume theory, besides Memarzadeh?

A. Besides Memarzadeh?

Q. Yes.

A. No, I am not.

Q. And have you heard others criticize the thermal plume theory in the past?

A. Yes, I have.

Q. And have you personally ever calculated the buoyancy or the force of this protective cocoon, or this thermal plume, however you describe it?

A. I have not done personal calculations

on that.

Q. Do you know if anyone else has?

A. I know that Farhad Memarzadeh has.

Q. At any rate, you haven't done that in connection with this case, correct?

A. I have not done the calculations, no.

Q. All right. And you're not going to be offering any testimony in court or trial at this matter about the forces involved in the thermal plume and the protective cocoon?

MR. GOSS: Object to form.

BY MS. ZIMMERMAN:

Q. Are you going to be doing the calculations...

MR. GOSS: Okay. That...

THE DEPONENT: It's a different question, yes.

BY MS. ZIMMERMAN:

Q. Have you been asked to do the calculations?

A. No. You asked two different questions there. I am not going to be testifying on any calculations on the thermal plume, but I am

providing opinion on the thermal plume, yes.

Q. All right. And, to your knowledge, the only person who has published in a peer-reviewed journal on the thermal plume theory is Dr. Memarzadeh, correct?

A. That is the only one that I am relying on, yes.

Q. All right. And Dr. Memarzadeh has, in fact, himself conducted or performed the mathematical calculations to represent the forces of this thermal plume, correct?

A. Yes.

Q. And that is not a calculation that you have done at this point in this case, correct?

A. I have not done that calculation.

Q. Okay. Have you been asked to do that calculation?

A. I have not been asked to do that calculation.

Q. All right. Turning to the Settles report, which I think you cite at number (w)...letter (w), not number (w)...that was another one that was provided to you by counsel, I presume?

A. Yes, it was.

Q. All right. And you understand that

what I intended to do, whether both needed to be referenced or if it was only one and the other one wasn't, and that this was part of the report. I couldn't tell you right now. It was an omission of mine to clarify the reference in here.

Q. Okay. I appreciate that. In any event, this Landrin article from 2005 seems to be something that you considered in forming your opinions that you reflect in your report; is that right?

A. I don't recall...sorry, I would have considered it. Whether it actually was a basis for any of the opinions in this section, I don't recall at this time.

Q. Okay. And (x), at any rate, the Maria Luisa Cristina article, "Can particulate air sample predict microbial load in operating theatres for arthroplasty?", that was one of the articles that was, in fact, produced to you or provided to you by counsel, correct?

A. Correct.

Q. All right. And, again, while you have a section about appropriate or...about the use of particle counting to predict bacterial contamination, actually doing particle counting is

not something that you personally do, correct?

A. I have initiated particle counting studies in my role, but I have not done any actual particle counting myself.

Q. Okay. And that is not something that you are trained to do?

A. I am not trained to do that.

Q. Okay. Yet you offer opinions about interpretation of particle counting, correct?

A. Yes.

MS. ZIMMERMAN: Mr. Keen, I am showing you now what has been marked as Exhibit 11 to your deposition today.

--- EXHIBIT NO. 11: Article by Birgand et al., from the American Journal of Infection Control, 2015

BY MS. ZIMMERMAN:

Q. Do you recognize this article? And if it would help, given the time of day, I think it may be...

A. Reference (i).

Q. ...reference (i).

A. Yes, I do recognize this article.

your opinion offered in letter e) is in contrast with that conclusion?

A. I would say that the generality of, taking beyond this study, that particle count could be a surrogate for microbial contamination should not be extended, and I would continue to support my statement that it is not a good surrogate.

Q. Okay. Jumping ahead to the other conclusions of summaries of your opinions offered on pages 22 and 23, at letter a), you are prepared to opine to the court in this case that, given that the Bair Hugger unit contains an intake filter, which you believe is tested to perform at a MERV 14 rating, that that would be effective at controlling airborne bacteria; is that right?

A. Yes.

Q. And from there you also extrapolate or opine that the ASHRAE standard of 170, which requires a MERV 14 filtration on supply air, would also be an appropriate filter to include on the unit; is that right?

A. Yes.

Q. And you would agree that ASHRAE standards do not apply to medical devices, correct?

A. I would agree.

devices.

Q. All right. You're not aware of a standard for filtration of medical devices, and you have no experience in designing filters for medical devices, correct?

A. That is correct.

Q. And you have no experience in evaluating filters for medical devices, correct?

A. No. I have experience in interpreting the rating of filters under the ASHRAE 52.2 method, and so...and interpreting the results of an ASHRAE 52.2 test.

Q. Is it your testimony that ASHRAE 52.2 governs filters on medical devices?

A. No. It is my testimony that the filter in this case was measured to the standard of ASHRAE 52.2 testing.

Q. All right. And before today, you were not aware that other forced air warming products use MERV filtration, correct?

A. That is correct.

Q. All right. But, at any rate, you have not personally designed a medical device before, ever, correct?

A. I have not.